Pacific Ocean waves on jetty

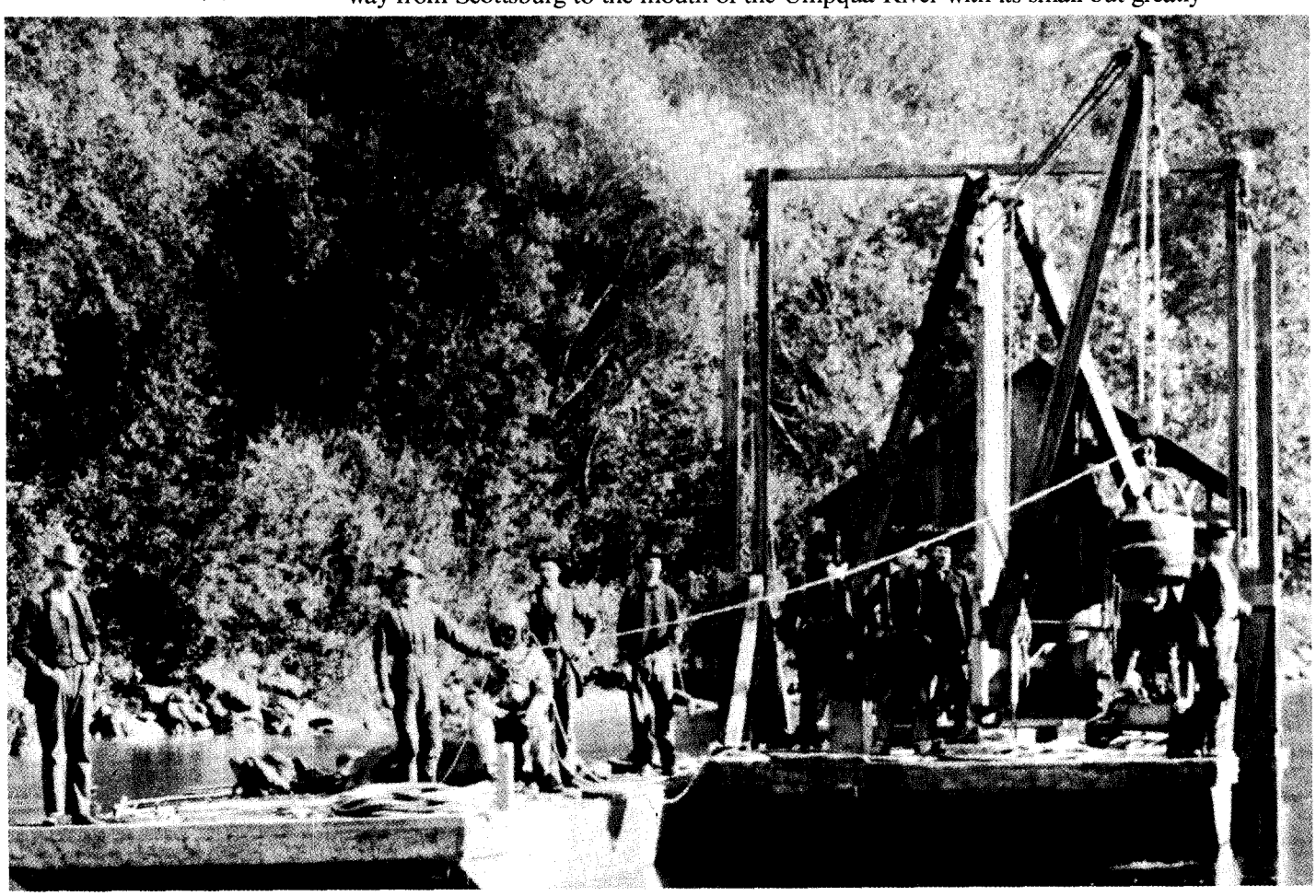
Chapter 6 The Oregon Coast, 1890 to 1920

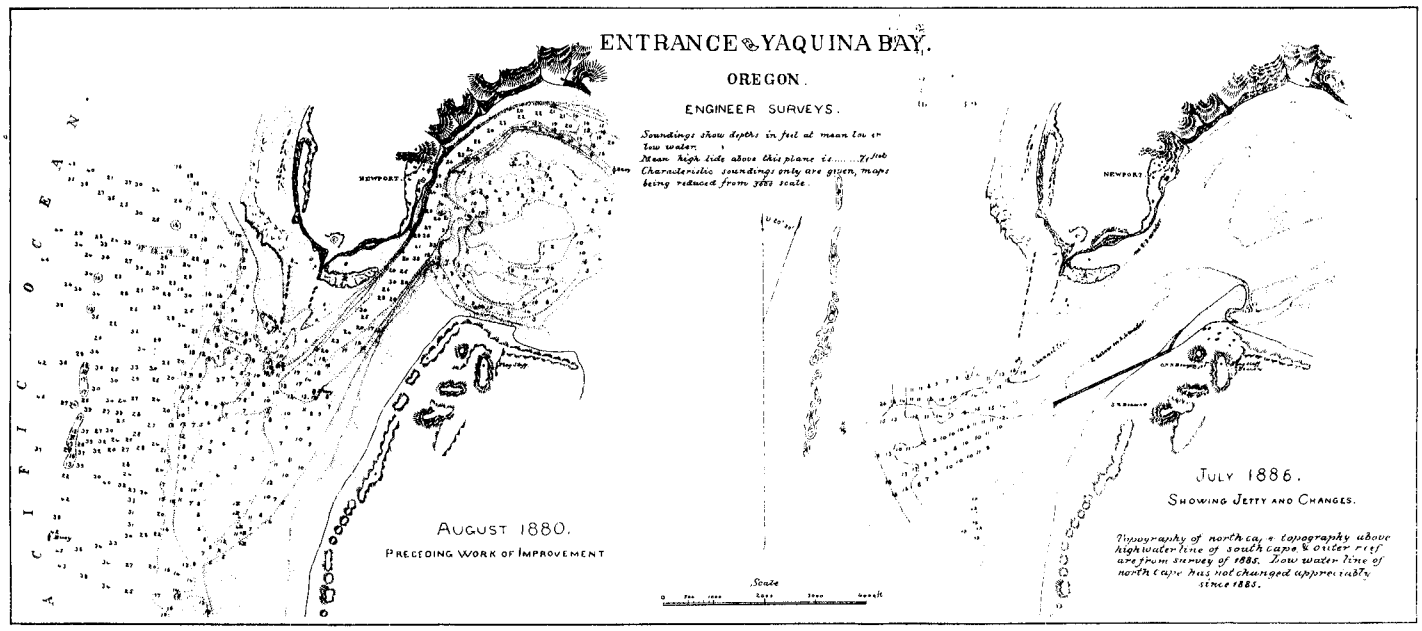
From the 1890s to the 1920s, Portland District engineers made great progress in developing the bays and harbors of the Oregon coast. Work begun before this period, at Coos and Yaquina bays, and at the mouth of the Coquille River, soon had to be revised because the structures installed were either not substantial enough to withstand the exceptionally rough waters of the Oregon coast or they did not produce the desired results. As James Polhemus, assistant engineer in charge of the Yaquina improvement, observed,

> *this part of the coast is one of the roughest and most exposed places in the world, probably due to the deep water near shore and the tremendous reach of the ocean to the westward, from which come the worst storms in this region. During storms the waves have been reported to break in water as deep as 8 fathoms, and sometimes a heavy swell breaks in a dead calm. It was thought for a long time that no harbor works along this part of the Pacific Coast, extending into the open sea, could be built to withstand the force of these waves.*[1]

Captain Powell began new work on the Umpqua River on the southern Oregon coast in 1885. An earlier project completed under Major Robert had attempted to make the river navigable between Scottsburg and Roseburg; however, even with the removal of the troublesome rocks, the swift current made navigation unprofitable. For the following 14 years, until 1899, work proceeded somewhat intermittently on a small project to remove rocks, rapids, and reefs on the river below Scottsburg. The Corps spent only $17,000 on the Umpqua in this entire period, but the improvements were adequate for the needs of the valley. The chief beneficiary of the work was the mail boat. Three times a week it made its way from Scottsburg to the mouth of the Umpqua River with its small but greatly

below: Bucket dredge on the Umpqua River.





above: 1880 and 1886 charts of the Yaquina Bay entrance.

appreciated cargo of mail, "express" freight, and occasional passengers. No other work was done on the Umpqua until 1922.[2]

Yaquina Jetty

In 1888, Captain Willard Young presented a plan to the Board of Engineers for a substantial improvement at Yaquina Bay. The south jetty on which work had begun in 1880 had resulted in the formation of two, 13-foot channels at the entrance, an improvement over the original seven-foot depth. But the two new channels constantly shifted; and even when they could be located, there was no assurance that sand obstructions had not formed in them.[3]

The Board approved Captain Young's plan, and work began in December 1888 on a 2,300-foot jetty from the north head. The existing south jetty was to be strengthened and raised to full high-tide level from its original mid-tide height. In addition, the south jetty was extended from 2,500 to 3,700 feet. The north jetty, eventually 2,800 feet long, was designed so that the channel would avoid the reefs just outside the entrance. When the Corps completed work in 1896, at a total cost of $710,000, the channel had been stabilized and the depth improved to nearly 17 feet.[4]

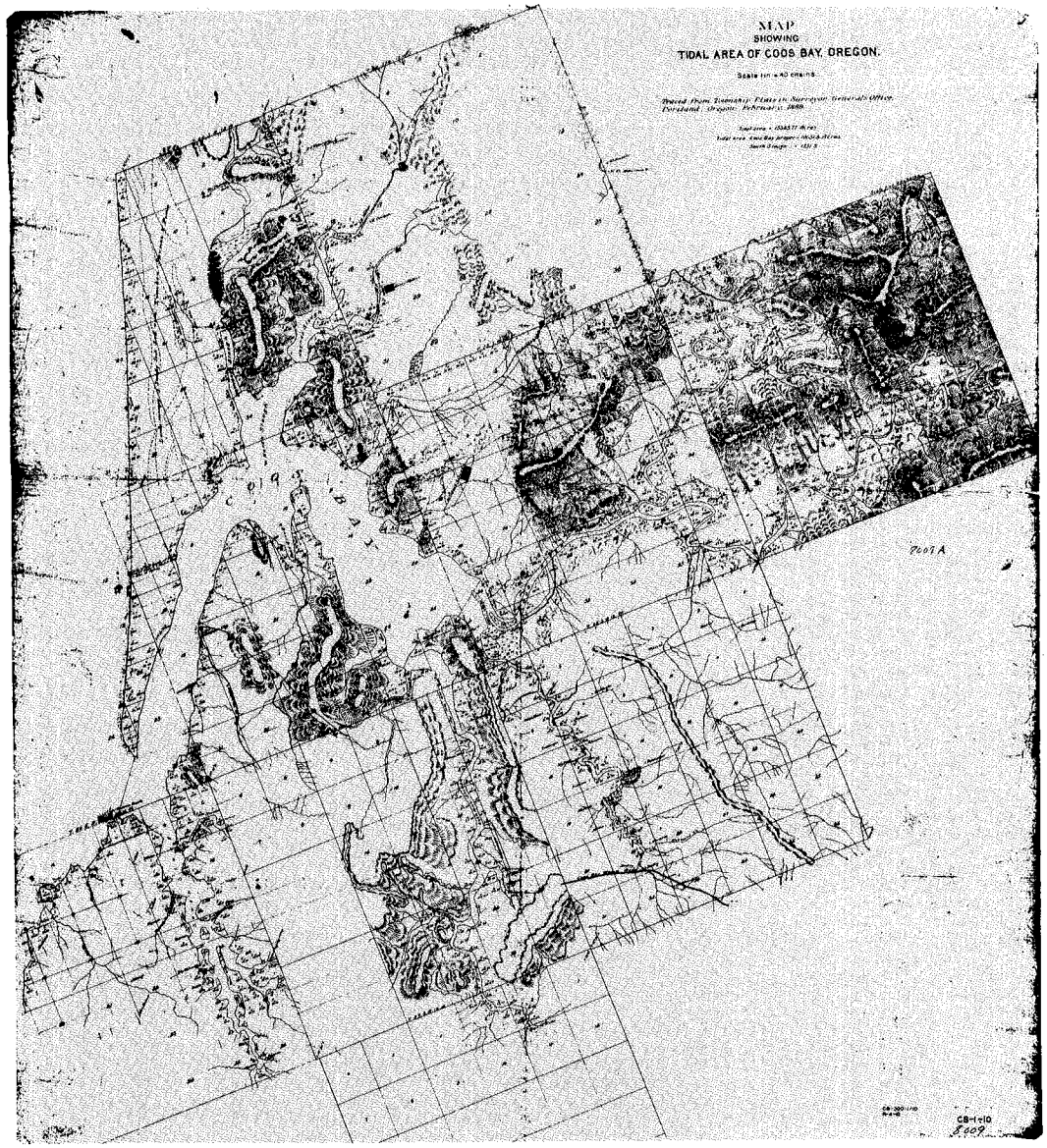
In 1899, the Board of Engineers held a meeting in the opera house of Newport, the principal town on Yaquina Bay. Newport, with only about 500 citizens at this time, had grown hardly at all since the Corps had first begun work at Yaquina Bay 20 years previous. The townspeople were later informed in the report by the three engineer officers who comprised the Board that the commerce of the area would be adequately served by the existing jetties for the foreseeable future. At this time the "total industries of any importance whatsoever in the whole region," according to the Board, consisted of two small salmon canneries, two sawmills, a creamery, sandstone quarry, and a railroad repair shop." The prediction of the Board, though not enthusiastically received by the citizens of the area, proved accurate. No other work was needed at Yaquina Bay until 1919.[5]

Coos Bay Jetty

Work at Coos Bay until 1889 had stabilized the channel at the entrance, but its depth of 13 feet had not been improved. The tremendous potential of the lumber trade in Coos Bay soon required that the depth at the entrance be improved to 20 feet. After noting that "there is tributary to Coos Bay an enormous forest area" estimated at 7.5 billion feet of merchantable timber in Coos County alone, Captain Symons foresaw other regional economic benefits occuring from such an improvement:

> *If the harbor could be improved to permit vessels drawing 20 feet to engage in this trade the cost of freight would probably be diminished to about one half . . . . But aside from the lumber and coal, and the agricultural, dairying and other interests about Coos Bay, the improvement of this harbor will have a far-reaching effect on the whole of southern Oregon, especially of the portion west of the Cascade Mountains.*[6]

In response to this recommendation, the Board of Engineers proposed a plan which provided 20 feet of safe water at the entrance to Coos Bay. The old jetty was to be abandoned; and in its place, two slightly converging jetties, 1,500 feet apart at the outer end, were to be constructed to high-water level. The north jetty was to be built from the southern end of the North spit for 9,600 feet and a south jetty extended from Coos Head for 4,200 feet. These jetties were to control the sand movement at the entrance to the bay and to direct the tidal scour to one portion of the bar. The Corps employed a method of



1889 chart of the tidal area of Coos Bay.

construction at Coos Bay nearly identical to that used on the first south jetty at the mouth of the Columbia. That is, laborers constructed a tramway, lowered fascine support mattresses and secured them with ballast, and dumped rubblestone from the railroad tram cars into the sea. After further careful study, the engineers decided to build the north jetty first and to delay the south jetty until the needs of the harbor made it necessary. The north jetty attained the project depth even before its completion in 1894.[7]

Two problems developed during construction. Rough seas destroyed over 1,000 feet of tramway and leveled nearly half the length of the north jetty at the outer end. Repairs and reinforcement work took until 1901 to complete. The other difficulty was accumulation of sand at the entrance. The strong winds at Coos Bay blew great amounts of sand from the North Spit into the channel. This problem had been recognized as early as 1891. The solution proposed at that date—and carried on for 15 years—was to hold the sand down by planting grass on it. The park commissioner of Golden Gate Park in San Francisco had successfully dealt with a similar problem by planting Holland grass (Arundo arenaria), a very hardy weed, over large areas of the park. Seeds and roots were shipped to Coos Bay, and each year an additional section of the North Spit was reclaimed by planting. By 1915, the Corps had planted nearly 1,000 acres, which prevented most of the sand from blowing into the channel.[8]

The inner bay at Coos Bay is shaped roughly like an upside-down letter "U." Above the entrance channel from the ocean, the inner channel extends north some eight miles, takes a two-mile eastward turn around North Bend, and then a seven-mile section goes south down to the head of navigation in the bay. Considerable dredging work had to be performed over this entire distance to make it navigable. Before improvements, the eight-mile segment contained only eleven feet of safe water, and the channel in the bay itself had

only a six-foot depth. From 1908 for a period of almost 20 years, the Corps achieved project depth in this waterway by dredging.[9]

In 1907, Congress appropriated $10,000 to construct the hydraulic dredge *Oregon,* which was assigned to work on harbors on the Oregon and Washington coast, principally Coos Bay. Dredging operations commenced in earnest at Coos Bay in 1908 immediately after completion of the *Oregon.* Four main shoals were removed, and depths in most sections of the channel in Coos Bay were at least 16 feet by 1910.[10] In that year Congress authorized a dredging project to improve the entrance channel and bay to 18-feet and to provide for a 300-foot-square turning basin. The engineers accomplished this by 1912, and thereafter annual dredging operations maintained project depths. The newly constructed seagoing hydraulic dredge, *Colonel P. S. Michie,* arrived at Coos Bay in January 1914 and carried out dredging there for many years. In 1919, Congressional authorization increased the depth of the 1910 project to 22 feet. The engineers completed this work to the upper end of Marshfield six years later and maintained it afterwards by annual dredging.[11]

The River and Harbor Act of 1896 had authorized improvements in the Coos and Millicoma Rivers. Snagging, the removal of "bowlders" and debris, and some occasional minor dredging were performed on the 5.5-mile length of the main stem of the Coos up to the confluence of the Millicoma and the South Fork of the Coos. A small dam on the South Fork of the Coos eliminated Carpenter Shoal. The same types of improvements were made for about eight miles along each of these streams and remained the kinds of work done on these rivers until 1948, when the project was modified. These simple improvements

Wave action destroying jetty tramway

meant a great deal to the farmers of the area. As District Engineer James B. Cavanaugh pointed out in 1922, "there is no railroad serving the locality. The river furnishes the only means of transportation for the farmers to reach the markets."[12]

By 1920 the destructive waters of the Pacific had beaten down nearly half of the north jetty. The tramways and receiving wharves had long since been washed away. While the entrance was still navigable, operation of the *Michie* demonstrated that dredging alone would not produce an adequate channel. In 1922, therefore, Congress provided that the south jetty, first proposed in the 1890 project, be constructed to a length of 3,900 feet and that the north jetty be restored and reinforced wherever necessary to achieve a 22-foot bay channel. The same method of construction used previously at Coos Bay and peculiar to the Pacific Coast was again employed on this work. Rough seas and greater high tides precluded the use of dump scows or a track directly upon the crest of the jetty. Instead, based on experience on the Oregon Coast, the engineers drove a heavy pile double-track trestle centered on the axis of the jetty and dumped stone directly into the jetty section from above. The south jetty was completed in 1928, and the north jetty in the following year.[13]

Siuslaw Jetty

A premilinary survey of the Siuslaw River and Bar in 1886 led Captain Powell to recommend against improving the channel at that location. The region's isolation and small population convinced him that while "a permanent deepening of the bar channel is desirable, it would be costly, and I am not assured that it is now necessary, neither that it certainly will be necessary for several years." He did admit that "lumbering on the Siuslaw may, in the future, be a reason for improving the entrance."[14]

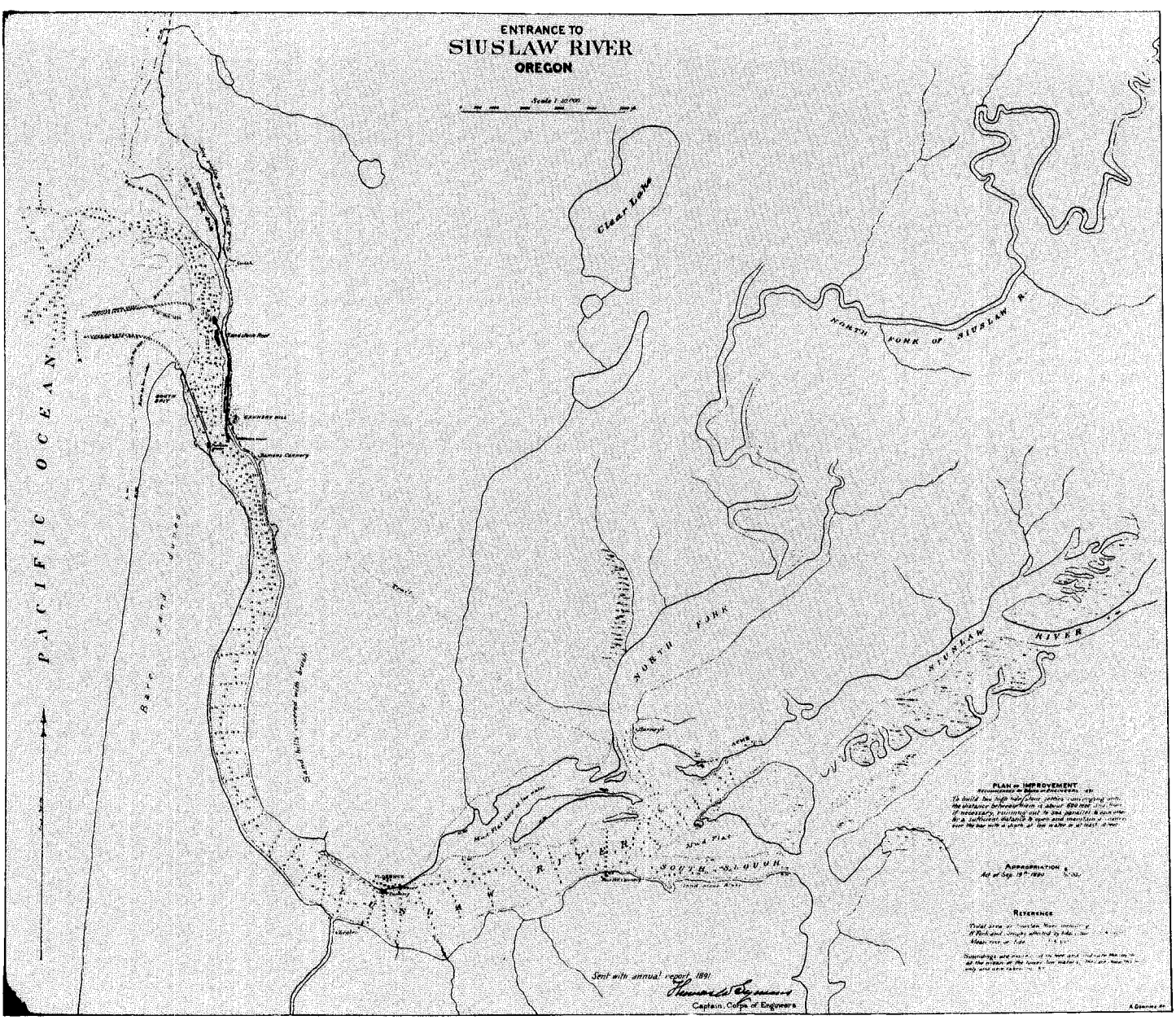
Two years later, Captain Young, Powell's successor reexamined the Siuslaw and came away more favorably impressed with its immediate commercial potential. Based on the timber and fishery resources of the area and the possibility of a railroad coming to the bay from the Willamette Valley, Young considered prospective commerce "sufficiently great to warrant an improvement."[15] Young's plan for two high-tide stone jetties prompted Congress to appropriate $50,000 for the project in 1890. His successor, Captain Thomas Symons, carefully restudied the project and doubled Young's cost estimate. Captain Symons succinctly described the problem at the mouth of the Siuslaw:

> *The unconfined channel has a range of about 1 mile, over which it wanders in making connection with the ocean. In consequence of this wandering and spreading out of the outgoing and incoming waters, the bar at times shoals very badly, while at other times it has a depth equal to the controlling depth inside the entrance. The depth on the bar varies from 5 to 12 feet at low water, and the bar channel changes very much in position and direction.*[16]

Based on Symon's report, the Corps suspended work and appointed a Board of Engineers to devise a revised plan and cost estimate. In June 1891, the Board formulated a project consisting of two converging rubblestone jetties on a brush-mattress foundation. The north was to be 4,500 feet long and the south to be 3,200. They estimated the cost at $751,850. The Board of Engineers stated that

> *when once work is commenced on the north jetty it should be pushed to completion as rapidly as possible. If this is not done, great additional expense is liable to be rendered necessary by the currents scouring out the sand in advance*

below: 1891 chart of the Siuslaw River entrance



of the jetty, compelling its construction in deeper water, as well as by endangering the unfinished work.[17]

Assistant Engineer G. A. Lyell performed a preliminary survey in the fall and work began the following year, 1892. However, funding by Congress for this project was not sufficient to complete the work quickly.[18]

Stormy winter seas also hindered progress. In the winter of 1899-1900 Captain William W. Harts, District Engineer, reported that rough waters carried away the sea end of the tramway as fast as the contractor extended it. Had construction funds been adequate, the structure would not have been exposed in its half-finished condition for such long periods of time and much of the damage could have been avoided. By 1901, the project halted altogether, no work ever having been done on the south jetty. Although the depth at the entrance had been only slightly improved, the spreading of the channel was held in check on the north side.[19]

In 1910, Major James F. McIndoe cited the importance of completing the project:

The river and ocean form the only means of transportation, and any increase in depths and permancency in location in the bar channel would be of great benefit in lessening the cost of marketing the products. There are tributary to the port extensive logging interests, besides salmon canning and dairy products, the sawmills having a combined daily capacity of 150,000 feet of lumber.[20]

The River and Harbor Act of 1910 provided for the completion of the original 1890 project with local contributions of one-half of the cost. In 1917, the work was at last finished. The improvement brought the depth at the entrance to the Siuslaw to 12 feet at low water, more than double the original depth of safe water.[21]

In 1925, Congress appropriated funds to extend the project depth five miles up the Siuslaw River to the town of Florence, the commercial center in the area. The Corps completed this work—snagging, boulder and debris removal, dredging, sluicing and revetment—by 1930. The maintained project proved adequate for the needs of the area until 1958.[22]

Coquille Jetty

The work done at the mouth of the Coquille River had, by June 1888, resulted in a 1,926-foot jetty extending from the south side of the mouth. Depth at the entrance improved to six feet at low tide; originally it had been three feet.[23] In 1891, Captain Symons, citing the "steady and rapid" growth of the commerce carried on through the mouth of the Coquille, proposed that further improvements be made at the mouth. At this time, he reported that

the principal industries of the valley are lumbering and farming. The timber is a good quality of fir, white cedar, spruce, ash, and myrtle . . . . The dairy and grazing region halfway south to Port Orford finds an outlet at the mouth of the Coquille.[24]

The 1892 River and Harbor Act provided for extension of the south jetty to 2,700 feet and the construction of a 1,575-foot north jetty, each to stand three feet above high water. Construction of plant and equipment, and of receiving wharves and approach tramway, proceeded until late 1894. In 1895, using the mattress foundation-tramway-rubblestone method, construction of the jetties themselves began. Work proceeded somewhat slowly

below: Town of Florence on the Coquille River.

Early improvements at the mouth of the Coquille River.

until 1908 when it was completed. Small appropriations and considerable sea damage again delayed work. On several occasions, the district engineers responsible reported that a single, large appropriation would enable them to complete work at the Coquille within one year.[25]

Except for dredging the channel to 13 feet between the jetties to a point nearly 1.5 miles upstream, the Corps of Engineers did no further work at the mouth of the Coquille until 1942. At that time the north jetty was reconstructed. The channel work had been discontinued in 1932. Previously, minor dredging, snagging, and clearing had maintained a depth of about five feet in the same stretch of water.[26]

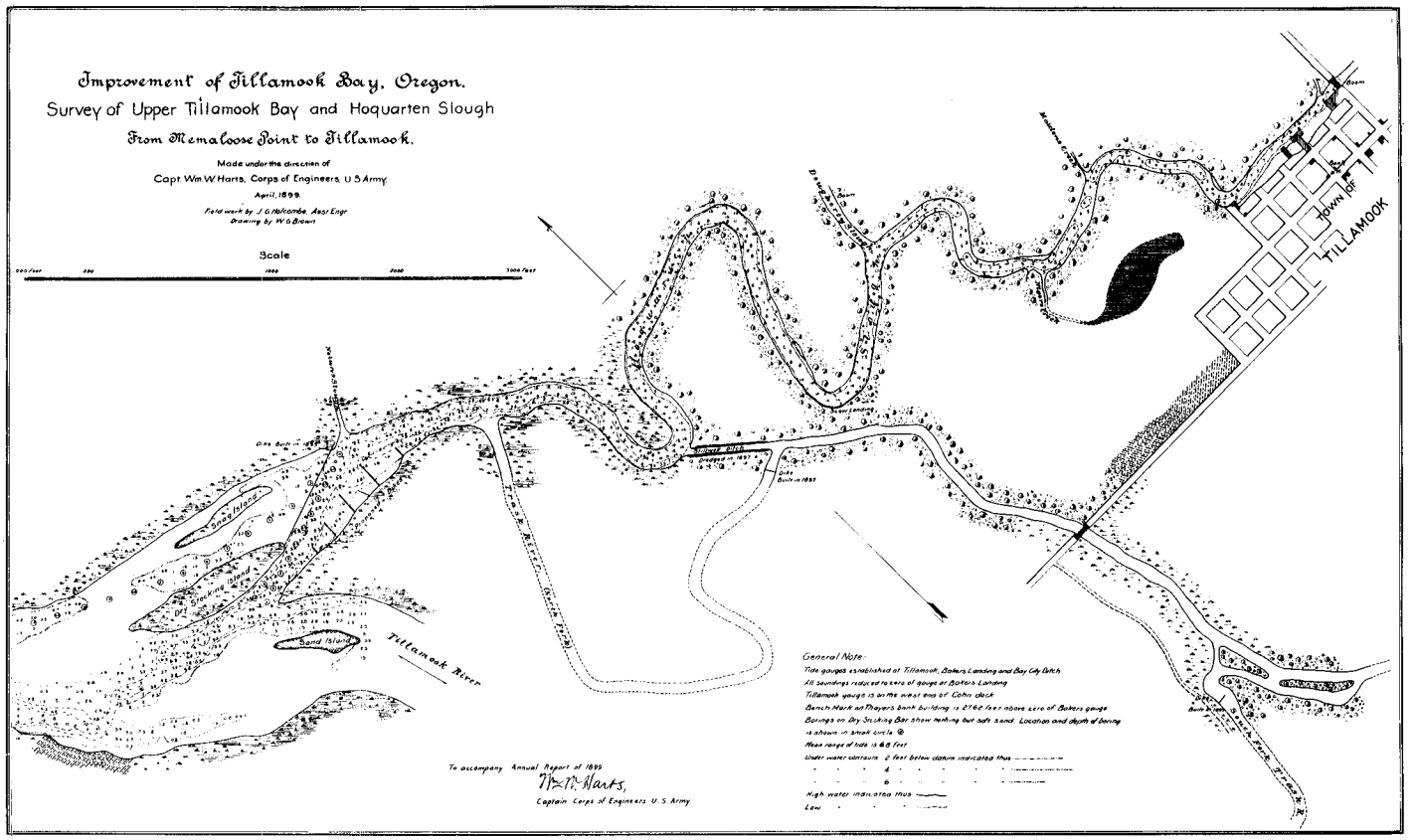
Tillamook Jetty

Although minor improvements were undertaken in the 1890s at Tillamook Bay, Congress authorized no substantial, permanent project until 1912. At the turn of the century, local interests at Tillamook Bay urged a major improvement in their waterway, calling for a channel depth of 20 feet over the bar, 16 feet to Bay City, and 14 feet to Tillamook City. This would have involved constructing two jetties and considerable dredging at a total cost estimated at $2.2 million. Four previous studies by Portland District Engineers between 1897 and 1909 recommended against such major improvements, given the extent of commerce to be benefitted by such an expenditure. Local interests demanded improvement of water transportation to facilitate exploitation of the immense stands of fine timber in the area. When the affected communities offered to contribute $500,000 to the project, the Corps decided to take another look at the proposed improvement. Still, a Board of Engineers turned down a modified project which called for two jetties and improvement to Bay City only, with a local contribution of 25 percent of its costs. Resulting benefits did not seem to justify the expenditure of $1,300,000 by the general government.

Finally, after intense negotiations, local interests and Portland District Engineer Major J. J. Morrow agreed in 1911 to a further scaled-down plan. The compromise called for the localities involved to pay half of the cost. The River and Harbor Act of 1912 provided for construction of a 5,700 foot jetty on the north side of the entrance to provide a 16-foot channel, "and of such width as can be practically and economically obtained." The project also provided for a channel from the entrance to Miami Cove and Hobsonville 18 feet deep and 200 feet wide. The Corps completed this improvement by 1917 at a cost of $800,000, with local interests paying half that amount. The work was considered finished when repairs to the north jetty and the addition of a groin dike were carried out in 1933. The cost had risen to $1,026,000. The River and Harbor Acts of 1919 and 1925 had restricted the channel work to points north of Hobsonville.[27]

Nehalem Jetty

In 1889, after a survey at Nehalem, Captain Young recommended construction of two converging high-tide jetties at a cost of $325,927; but money was not appropriated for the project. At the time, Captain Young believed Nehalem Bay worthy of improvement because of the immense quantity of merchantable timber adjacent to the Nehalem River: "the natural route for this timber to reach a market is down the river and over the bar. Logs can easily be run down the river for a distance of 50 miles and more to tide water, where they can be sawed up, and, if the bar is improved, the lumber can be shipped by vessel to any port desired." Although Congress appropriated no money, local agitation for improvement continued. In 1898 Captain Fisk considered a modified project calling for only one jetty but doubted it would bring about the desired results. Moreover, he did not consider that the



above: 1899 chart of Tillamook Bay near city of Tillamook.

present state of commerce justified improvement at the expense of the general government. His estimate for the cost of two jetties was $610,000.[28] Until 1912, only $685, the cost of the original survey, had been spent. In that year, the River and Harbor Act authorized most of what Captain Young had recommended more than 20 years before.

The difficulty at Nehalem stemmed from the bay entrance which was so wide that the navigation channel itself was shallow and constantly changing. The six-foot depth that prevailed at the bar permitted entrance only to small, coastwise vessels. The Port of Nehalem had already constructed a 2,385-foot south jetty. Thus, the Act of 1912 provided for a 2,565-foot extension to the existing south jetty and a north jetty 3,850 feet long. Each was 10 feet wide on the top and 30 feet high on the shoreward half section, and 15 feet wide on the top and 32 feet high on the seaward side. The estimated cost of the project was $600,000, of which the Port of Nehalem contributed half. The work was completed on both jetties by 1918, resulting in increased channel depth and stabilization.[29]

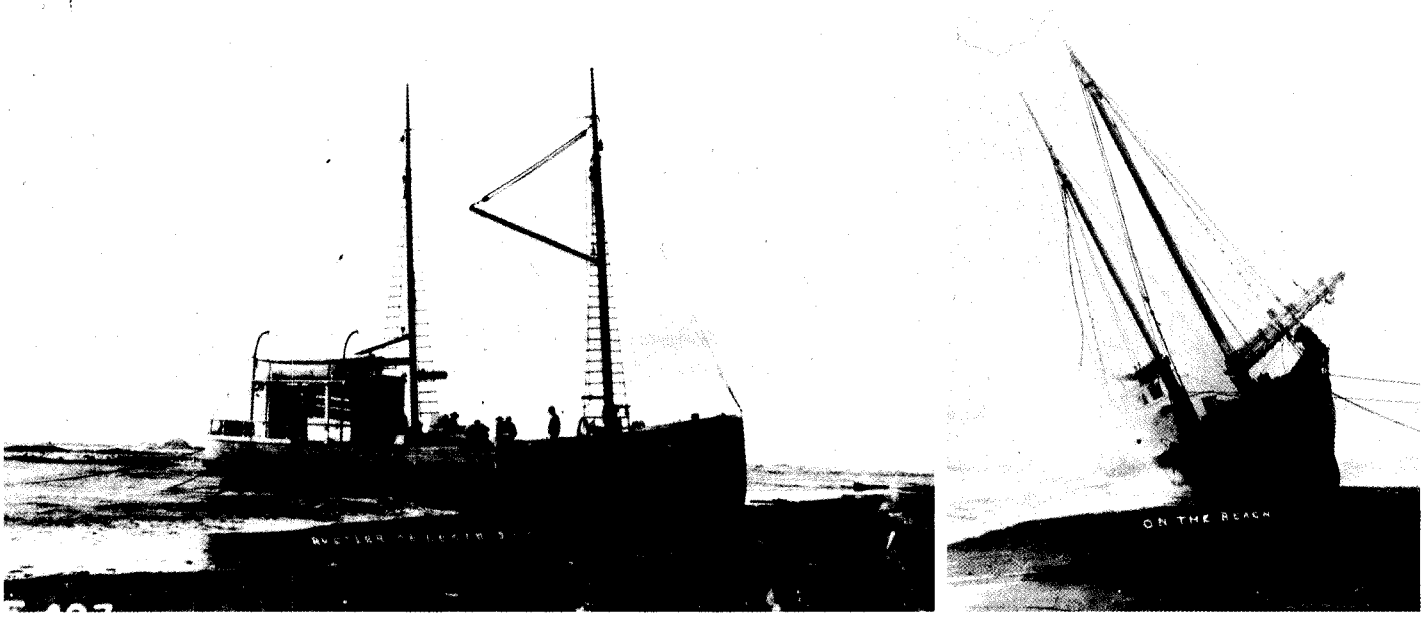
Accomplishments on the Coast

Work on the Oregon coastal harbors in the late 19th and early 20th centuries represented a significant phase in the mission of the Portland District. The major jetty projects at Coos Bay and at the mouths of the Yaquina and Coquille Rivers led to the development of new techniques and equipment to deal with the powerful and unique forces of nature at work along this stretch of the Pacific Ocean. Such knowledge would play a useful role, as Captain Powell noted, in the even more challenging job of building the Columbia River jetties:

> *The results of the Yaquina, Coos Bay and Coquille jetties are favorable for the Point Adams work: all the bars are of the same character and are formed in the same way, only they and the forces at work of different scales. Two of the former jetties were projected on reasons like those which govern the plan for improving the Mouth of the Columbia.*[30]

Conditions were especially trying in the face of limited appropriations. Winter storms often destroyed an entire year's work, and the necessary repairs ate into future funds and time available for new construction in subsequent years. Local interests continually chaffed at the slow progress, blaming the delays on the Corps' method of doing the work by hired labor and purchase of materials under its own supervision. But the isolated locations of the projects, the scarcity of knowledgeable contractors with adequate plant, and the limited yearly appropriations made contract work largely impossible. Much of the equipment and material for these projects had to be purchased in the East or San Francisco, adding to delays and expenses.

Local interests also criticized the reluctance of the Corps to recommend and carry out even larger-scale projects, often exaggerating the present and future commerce benefitting



above: Beached vessels, common on the early Oregon coast, emphasized the need for coastal improvements.

from such proposed work. While admitting that current population and commerce might not justify costly channel improvements at most locations, local citizens felt that the development of their region's vast timber, fishing and agricultural resources, with its attendant growth, would never occur unless the general government first improved transportation facilities in the area's bays and rivers. Portland District Engineers were sympathetic but realistic professionals who knew that their proposals would receive close scrutiny both within the Corps and the Congress and thus tailored their recommendations to a conservative assessment of local needs for public improvements.

Much had been accomplished by 1920 on the Oregon coast. Approximately $4,772,000 had been expended on Corps' projects improving rivers and harbors at this locale. This amount did not include the $793,348 in local contributions required on certain projects after 1910. The work resulted in substantial improvements in the bays and harbors, allowing for a gradual growth in commerce. Rail service to the region was limited and water transportation constituted the most economical way to develop the valuable resources of the area. What Colonel J. B. Cavanaugh reported in 1920 concerning the results of the Coos Bay improvement applied to the other coastal projects: "The improvement has rendered transportation by water safer and less costly and has greatly increased the waterborne commerce of the port by permitting vessels of greater draft to enter the harbor."[31]